SANGAMO WESTON
PRESENTATION OF REMEDIAL INVESTIGATION RESULTS

Thank you, Michelle, good evening, my name is David Schaer from Versar Incorporated, and I would like to give you a brief review of the Sangamo Weston site history, the remedial investigation results, and an overview of the viable alternatives generated from the Feasibility Study. All of the slides that I will be using tonight are from the Remedial Investigation Report and the Feasibility Study Report. You should have copies of them in the handouts that you picked up on the way in.

First, I would like to discuss the background and the history of the site. The Remedial Investigation and Feasibility Studies were performed on seven sites in Pickens County, South Carolina. This slide shows the location of the individual sites and their relationship to the manufacturing facility. All of the sites are located in rural areas outside the city limits of Pickens. The plant site borders the city limits on the north side. The other sites are located within a three mile zone outside of the city limits.

Sangamo Weston has owned and operated the capacitor manufacturing plant which started operations in 1955 and has had a work force of up to 1,500 people. The primary products manufactured by the plant have been capacitors and other related electrical equipment.

Sangamo manufactured several kinds of capacitors and used several kinds of dielectric fluids. Some of the capacitors used a dielectric fluid which contained polychlorinated biphenyl or more commonly referred to as PCBs.

As part of the manufacturing process, all of the capacitors were inspected and tested. The capacitors that failed to meet quality control standards were discarded along with other process and non-process solid wastes. The solid wastes were disposed of on the plant property in several locations and at a number of off-site locations. The off-site areas addressed in the RI and FS reports, as shown on this slide, are designated as the Nix, Dodgens, Welborn, Cross Roads, John Trotter and Breazeale sites.

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Sangamo discontinued using PCBs in 1977. Since the discontinuation of PCBs, Sangamo has completed remedial actions and investigations shown here:

In June 1987, Sangamo Weston and EPA Region IV signed an administrative order on consent which specifies actions to be taken. As required by the consent order, Sangamo Weston developed a RI/FS Work Plan, Standard Operating Procedures, Quality Assurance Project Plan and a Site Health and Safety Plan. These documents control the technical aspects of the RI. These planning documents were approved by the EPA in January 1988. The RI field work started in February 1988 and the RI Report was submitted to the EPA in November 1989, the FS Report was submitted to the EPA in June 1990.

Now I'd like to discuss briefly a summary of the Remedial Investigation results. The objectives of the investigation are to develop a database to define the nature and extent of contamination at the waste disposal sites, define the geologic and hydrogeologic characteristics of the sites, and assess contamination pathways and the potential for impact on public health and the environment.

A preliminary contaminate source investigation was performed prior to preparation of the RI Work Plan. The focus of the investigation was directed toward identifying waste disposal practices conducted by Sangamo and the types of waste disposed.

After general areas of waste deposition were identified, geophysical surveys were conducted at each site to locate magnetic anomalies that may indicate the presence of buried waste.

Also, as part of the preliminary investigation, soil borings and exploratory trenches were completed. The soil borings were used to locate and define the thickness of waste when present. Samples from these borings were collected and analyzed to characterize the waste. Additional, exploratory borings were used in conjunction with trenches to define the extent of the waste.

Now, I will discuss the findings from the RI report on an area by area discussion. First, we will start with the Sangamo Plant site. There are ten areas that were investigated. The slide that we are looking at shows these different areas. Soils at the plant site were characterized through examination of soil samples collected from monitoring well borings, soil boring, exploratory trenches, and surface soil sampling. Groundwater, surface water and sediment samples were collected and analyzed to characterize these media.

Considering the great amount of data collected during the plant site investigation, I would like to briefly discuss the summary of constituents identified.

Based on the analysis of samples collected from the different media that I just mentioned, the remedial investigation has determined that a number of constituents are to be addressed at the plant site. The primary constituents of concern are PCBs, VOCs, semi-VOCs, and metals.

The remedial investigation at area D has been delayed until a waste removal plan is completed.

Wastes were not found in ares E and G, but analyses of soil and groundwater samples has shown PCBs and VOCs to be present.

The slide that we are looking at now provides an overview of the wastes and contaminates found at the facility.

Now I will discuss the RI finding from the six off-site locations that were used for waste disposal.

The first location, the Breazeale site, is located about one mile south-southwest of Pickens and is adjacent to Wolf Creek. This slide provides an overview of the findings at the site. Public water is available in the site vicinity and no groundwater users have been identified downgradient of this site. The site consists of about seven acres. The wastes along with the majority of the surface soils with greater than 50 ppm total PCBs is covered with a geotextile fabric and a soil cap. The area is fenced and surface water drainage has been diverted around the site.

Results of the interim investigations and the RI indicate that approximately 2500 cubic yards of capacitor debris and soil are present in each trench. Analytical results for the waste indicate that PCBs are the principal constituent.

Results from groundwater sampling show that no PCBs are present although several VOCs have been detected in groundwater. No VOCs have been detected in groundwater on the other side of Wolf Creek, indicating that groundwater downgradient of the site is discharging into Wolf Creek. Analytical results for sediment samples show small concentrations of PCBs are present in a drainage ditch adjacent to the site; however, no PCBs were detected in sediments in Wolf Creek. PCBs were not detected in surface water, but small concentrations of VOCs have been detected periodically in Wolf Creek.

RI sampling indicates that PCBs and VOCs are the most significant constituents at the Breazeale site.

The Nix site is located approximately two miles northeast of Pickens and is adjacent to a tributary to Wolf Creek. This slide provides an overview of the site conditions. Public water is available in the vicinity of the Nix site, one groundwater user has been identified downgradient of the site. The site is about 7.5 acres with a ravine in the center. Wastes from the Sangamo Weston plant have been found in the ravine. With the approval of EPA and SC DHEC, waste was removed from the site in 1980. The waste was placed in an EPA- and SC DHEC-approved secure landfill located on the Sangamo Weston Plant site. The Nix site was then graded and seeded.

Results of the RI field investigation indicate that approximately 20 cubic yards of capacitor debris and soil are present in the ravine. Analyses of the waste indicate that PCBs are the principal constituent in the waste.

Results of groundwater sampling indicate that no PCBs or VOCs are present in groundwater downgradient of current and past areas of waste deposition. No PCBs were detected in sediments in the tributary to Wolf Creek or in surface water samples.

The Dodgens site is located three miles northwest of Pickens and is adjacent to the Middle Fork Twelvemile Creek. Again, this slide provides an overview of site conditions. Public water is available in the vicinity of the Dodgens site and no groundwater users have been identified downgradient of the site. The site consists of about 6.5 acres and received various types of waste from the Sangamo Weston plant. With the approval of EPA and SC DHEC, waste was removed from the site in 1980. The waste was placed in an EPA- and SC DHEC-approved secure landfill located on the Sangamo Weston plant site. The Dodgens site has been graded and seeded.

Results from the RI field investigation indicate that approximately 100 cubic yards of capacitor debris and associated soil are present on small portions of the site. Results from analyzing waste samples indicate that PCBs are the principal constituent. Results from sampling groundwater show that no PCBs are present at the site. Several volatile compounds were present in three of the five monitoring wells in one of two sampling rounds. Two semi-volatile compounds were detected in groundwater. Sediment sampling results from Middle Fork Twelvemile Creek indicate that PCBs were present at one location at a concentration of 1 ppm; however, further downstream no PCBs were detected. No PCBs were found in the surface water samples.

The RI sampling indicates that PCBs are the only significant constituent and that PCBs are not migrating from the site.

The Cross Roads site is located approximately three miles southwest of Pickens. This slide provides an overview of site conditions. Public water is available in the vicinity of the Cross Roads site and there are no known groundwater users downgradient of the site. The site, which is about fives acres, received a wide variety of domestic waste from local citizens and various types of waste from the Sangamo Weston plant.

Results of the RI field investigation indicate that approximately 400 cubic yards of capacitor debris is present. Analytical results from testing waste samples indicate that PCBs, total 1,2-dichloroethene and trichloroethene are the most significant constituents at the Cross Roads site. Additional soil, sediment and groundwater investigations have been undertaken to characterize the extent of PCBs and VOCs contamination.

The John Trotter site is located about two miles north-northeast of Pickens and is adjacent to an unnamed tributary to Town Creek. This slide recaps the results of the findings for this site. Public water is available in the vicinity of the John Trotter site and there are no known groundwater users downgradient of the site. The site consists of about three acres and received various types of waste from the Sangamo Weston plant.

Results from the RI field investigation indicate that approximately 100 total cubic yards of capacitor debris and soil are present in two areas. Waste from a machine shop may also be present on the site. Analytical results of waste samples indicate that PCBs, tetrachloroethene and trichloroethene are the principal constituents present on-site. Analytical results for groundwater found no VOCs, PCBs, or semi-volatile compounds. Sediment sampling results indicate that PCBs are present in one sample (0.09 ppm total PCBs) collected downstream of the site. PCBs were not detected in surface water.

The RI sampling indicates that PCBs are the most significant constituent at the John Trotter site.

The Welborn site is located about two miles east of Pickens. This slide provides an overview of the findings at the site. One private well is located approximately 1,000 feet southwest of the site. The residence is on public water and the well is not used. Public water is available in the vicinity of the Welborn site. No current groundwater users downgradient at the site have been identified. The site, which is about four acres, has a ravine in the center. The ravine was found to have domestic waste from local citizens and various types of waste from the Sangamo Weston plant.

Results of the RI field investigation indicate that approximately 300 total cubic yards of capacitor debris and affected soil are present in four areas in the ravine. Analysis of the waste indicates that PCBs are the principal constituent in the waste.

Analytical results of groundwater found one VOC in one well during the first sampling round. Semi-volatile, pesticide and PCB compounds were not detected.

The RI sampling indicates that PCBs are the only significant constituent at the Welborn site and PCBs are not migrating from the site.

SANGAMO WESTON

PRESENTATION OF VIABLE ALTERNATIVES FROM THE FEASIBILITY STUDY

Now that we have looked at the results that have been generated from the RI investigation, I would like to discuss the viable alternatives that have been determined from the Feasibility Study.

During the Remedial Investigation process that has been described, preliminary remedial action objectives are developed to identify or to correct identified contamination problems and then updated as new information becomes available during the progress of the Remedial Investigation. At the Sangamo Weston plant site, groundwater, soil, solid waste, and sludge were determined to be the media of concern. At the Breazeale, Dodgens and Crossroads sites the media of concern was determined to be groundwater, soil and solid waste, while at the Nix, Welborn and John Trotter sites the media of concern was determined to be soil and solid waste.

In the process of arriving at a remedial solution to a contamination problem, the Feasibility Study can be seen as occurring in three phases: the development of alternatives, the screening of the alternatives, and the detailed analysis of the alternatives. In actual practice, the specific point at which the first phase ends and the second begins is not really distinct. This means that the development and screening of alternatives are discussed together to better reflect the interrelatedness of the efforts. Once you find and identify the universe of technologies, then you can start assembling different ones into different alternatives to correct the problems. Now, these different alternatives are screened again and this is where the selected alternatives get compared against the nine EPA criteria which are presented on this slide and in the glossary in the back of your fact sheet. Now, this is where the real differentiation takes place, and that's really the reason that we're here tonight, to present you with the 13 alternatives that have been identified, and you have an input into determining which one is going to be selected.

Using the process described, groundwater, soil, solid waste and sludge remediation alternatives were developed and evaluated. It should be noted, as I said before, a large number of technologies were screened before selecting the final 13 that we're going to be presenting tonight. These other technologies were determined to be either not applicable or they had no advantage over the 13 that were being retained for further analysis. it should also be noted that with the exception of a no action alternative, each of these retained alternatives would have to meet or exceed all applicable or relevant and appropriate requirements with regard to protecting human health and the environment to be acceptable. This slide shows the summary of remedial alternatives.

Now we'll take a look at each of these alternatives in turn. The Superfund program requires that the no action alternative be considered at every site to form a baseline for comparison for all other alternatives being considered. Under the no action alternative, no treatment actions would take place. What would occur are things called institutional controls such as fencing, warning signs, other types of restrictions to the property that would limit the use of people consuming water from the shallow aquifer. One further thing that would be accomplished is continuous monitoring. There would be a collection and analysis of groundwater samples to continually assess the continuing release of contaminants from the soil and wastes into the groundwater to see if the contamination was increasing and maybe an action would be required later on. The cost for Alternative 1 and the remaining 12 alternatives are summarized on pages 6 and 7 of your fact sheet.

Now, I would like to briefly describe the 12 remaining alternatives. Considering the number of alternatives that we will be talking about, I have organized the slides that we will be looking at in the same format as pages 6 and 7 of your fact sheet. This slide shows five alternatives that involve little or no treatment.

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These alternatives are pretty straight forward and involve land restrictions, the containment of solids, the containment of soils and sludge and the disposal of wastes in- and off-site landfill.

The next two alternatives, number 8 and number 10 are alternatives that minimize the need for long-term management. The only difference between alternative 8 and alternative 10 is that number 8 requires treatment and disposal of solids on-site where as number 10 requires treatment and disposal of solids to an off-site location. As you can see there are three technologies involved within these alternatives which are:

- Thermal Processes
- Chemically Altering Contaminants
- or Physically Stabilizing Wastes

Now I would like to explain how each of these technologies work. There are two types of thermal processes that have been determined to be appropriate. These are thermal destruction and thermal separation. Thermal destruction or more commonly called incineration typically occurs at fifteen to eighteen hundred degrees fahrenheit and is a chemical reaction. This is where compounds subjected to flame or these high temperatures do not retain their chemical identity. They're transformed into something else. Thermal separation, on the other hand, typically occurs at a temperature of around six hundred degrees. This particular technology is a physical change. In other words, the chemical retains its identity. It does not change. It's still the same. If we use a common example, let's take gasoline, and we're going to incinerate it in your car engine. We'll look at that one first. Incineration of gasoline in your car engine where it's subjected to flame. The exhaust gases coming out are typically carbon dioxide, carbon monoxide, oxides and nitrogen, water vapor. It's no longer identifiable as a gasoline. It's something totally different. Under thermal separation, if you subjected gasoline to a temperature of six hundred degrees, what would you have? You'd have hot gasoline vapor. It would still be the same thing. So that's the key difference between these two technologies.

Now, let's take a look at incineration as an alternative. This alternative consists of excavating and treating contaminated soils using high temperature incineration at twelve to fifteen hundred degrees. Subjecting the volatile organic compounds found to these temperatures will result in their virtual complete destruction. The incinerated soil would then be processed on the site or off-site as specified by alternative 10, water is added to the incinerated soil since you've driven off all the water in the incineration process and then put back on the site. The incinerator would have to meet EPA requirements. Again, no air emissions without being tested and meeting applicable standards.

Now, let's look at thermal separation. This alternative also consists of excavating soils and treating the soils at low temperatures either on or off-site depending on the alternative chosen. This is a process in which soils or sludges with organic compounds are heated in a rotary kiln. The volatilized organics are then transferred, using nitrogen as the carrier gas, and cooled to condense the organic components. The condensed chemicals are then collected and treated at an appropriate treatment facility.

We have another option here which is called glycolate dechlorination which is a chemical treatment. This treatment is used for PCB-affected soils and is accomplished by dehalogenating (this is removing the chlorine atom) the PCB molecule using various reagents.

The resulting molecule is generally considered to be less or non-toxic, and the treated material can usually be backfilled or otherwise disposed of.

Now the next alternative that we have is physically stabilizing the wastes. Stabilization, also known as solidification or fixation is applicable to solids, liquids, or sludges. The process can be performed in situ - this means that the material is left right where it is and treated - or in tanks or containers. This process facilitates a chemical and/or physical reduction in the mobility of hazardous constituents, including PCBs, VOCs, metals, and incinerator ash. The mobility is reduced through the binding of hazardous constituents, generally with cement mixtures, into a solid mass that has a low permeability which resists leaching of the contaminates back into the environment.

This slide shows our next alternative, alternative no. 13 is an alternative that includes treatment but requires long-term management. This alternative calls for a combination of response actions that will treat sludges, contain affected solids and prevent the use of adjoining property. In summary this alternative consists of several remedial actions that will be applied in different combinations at the various disposal locations. These combinations are:

1. A no action would be applied to groundwater at the drain field (plant site) Nix, and Welborn areas. A limited action would be used at all other areas;

2. Soil would be capped in place in all locations except Nix, Welborn and Crossroads.

3. Sludge in the lagoons would be excavated, treated, and disposed in an on-site landfill.

4. Solid wastes would be capped in place.

With this treatment once the groundwater is treated to standards approved by the state of South Carolina and the EPA, it will be discharged to a viable surface water body.

Now let's look at our last alternative no. 9. This alternative also requires long-term management. The difference here is that soil remediation would be done in-situ. The in-situ remediation of soils would be accomplished by a technology called bioremediation. This process option, coupled with groundwater collection can provide a substantial reduction in concentrations of organic compounds in the soil. This process involves the introduction of micro organisms into the contaminated soils where they basically consume organic chemicals. These "bugs" as they are typically called are capable of degrading many organics into water and carbon dioxide in the presence of sufficient oxygen and nutrients such as nitrogen and phosphorous. It must be kept in mind that this process could take up to ten years to remediate the contaminated soils. Laboratory testing of this technique is ongoing at this site and sites across the country.

These are the proposed alternatives, now I am going to turn the meeting back over to Michelle Glenn, who will present EPA's preferred remedy.

Our next three alternatives, as shown here, 7, 11 and 12 are alternatives that minimize the need for long-term treatment. These 3 alternatives are introducing a new treatment technology that I have not discussed which is groundwater treatment. What this involves is the installation of extraction wells at areas with contaminated groundwater. The wells are pumped which causes the groundwater to flow toward the extraction well where it is then withdrawn and treated. There are two proven methods of groundwater treatment which are:

o Carbon Adsorption

o Air Stripping

The carbon adsorption technology is used to remove organic contamination. It has a long history. It's a proven technology. It's commonly used to remove organic materials from both air and water media. The system envisioned is granular-activated carbon. It's a highly adsorbent powder or can be in a granulated form. An important factor to note in this particular technology is that any gases escaping, not adsorbed in the system, would be collected and treated before being released to the atmosphere.

The next alternative under groundwater is air stripping. In air stripping, the groundwater is pumped out of the aquifer and treated by a process known as air stripping. A common analogy is if you see a fountain in a park where the water is ejected up into the air and breaks into smaller particles and starts falling. That's a good way to get rid of gases that are in that water. That's a common example of air stripping. In this particular application, it would be in a closed system, such as the gases that were emitted from that water would be collected for further treatment before being discharged. It's a paramount item of importance in any of these technologies that there are no releases to the atmosphere until this material is tested and meets standards. Otherwise, it cannot be approved. As a finishing or polishing stage under this alternative, the groundwater would also be - after the air stripping would be subjected to granular-activated carbon to remove any remaining compounds. Again, this is just a polishing step, but it's very similar to the alternative previously mentioned.